OVERPRESSURE VALVE FOR A PACKAGING CONTAINER

[0001] Background of the Invention

[0002] The invention relates to an overpressure valve for a packaging container.

[0003] An overpressure valve known from German Patent DE 31 47 321 C2 has a cup-shaped holder body, with a flange region extending all the way around toward the wall; the flange region can be joined to the inside of a length of material that forms the packaging container. A diaphragm with peripheral play relative to the holder body is disposed on the bottom of the holder body. The diaphragm is clamped against the bottom of the holder body by a holding-down device that is bone-shaped in plan view. The known overpressure valve thus requires three components, and in particular mounting the diaphragm and the holding-down device in the holder body is relatively complicated and expensive.

[0004] Advantages of the Invention

[0005] The overpressure valve of the invention for a packaging container, having the characteristics of claim 1, has the advantage over the prior art that it comprises only two components and can thus be produced more economically.

[0006] Advantageous refinements of the overpressure valve of the invention are defined by the dependent claims. In a preferred version of the invention, the indentation has the form of at least two intersecting circles. Because of this special shape, surprisingly, an especially good response behavior of the overpressure valve can be attained; that is, the overpressure valve opens at an overpressure as low as 2 mbar, for instance.

[0007] It is also conceivable to embody the indentation in the form of a corporate logo or a protected design trademark, so that an especially good recognition value of the overpressure valve is established while dispensing with particularly low opening pressures. It is also preferably provided that there be a gap between the top side of the diaphragm and the top side of the peripheral region of the holder body. As a result, even for packaging containers placed quite close together, a more-secure passage of the gas to the at least one opening in the packaging container is assured. An especially simple embodiment of the diaphragm while simultaneously creating the passages for the gas to the opening in the packaging container is accomplished if the diaphragm is embodied in striplike fashion.

[0008] Drawing

[0009] Exemplary embodiments of the invention are shown in the drawing and will be described in further detail below. Shown are:

[0010] Fig. 1, a plan view on a first overpressure valve of the invention;

[0011] Fig. 2, a section taken in the plane II-II of Fig. 1;

[0012] Fig. 3, a plan view on a diaphragm of the kind used in the overpressure valve of Figs. 1 and 2;

[0013] Fig. 4, a plan view on a second overpressure valve of the invention;

[0014] Fig. 5, a section corresponding to Fig. 2, for an overpressure valve which is joined to a packaging container by an adhesive bonding operation; and

[0015] Fig. 6, a perspective view of a packaging container with an overpressure valve.

[0016] Description of the Exemplary Embodiments

[0017] In Figs. 1 and 2, a first overpressure valve 10 is shown. The overpressure valve 10 has a holder body 11, which is of plastic and in particular polyethylene and which is preferably produced by injection molding. In this exemplary embodiment, the holder body 11 has a round shape in plan view, but it may have any other shape instead, such as a square shape. The holder body 11 is embodied as a shallow, cup-shaped body and, as can be seen best from Fig. 2, it has a peripheral region 13 extending all the way around that is raised relative to a middle region 12. The top side of the peripheral region 13 has a raised area 14, likewise extending all the way around, that is approximately triangular in cross section. The shape of the raised area 14 serves to enable joining the overpressure valve 10 or holder body 11 to a packaging container by ultrasonic welding (or some other heat sealing method). Alternatively, a plurality of raised areas 14, preferably concentric to one another, may be embodied.

[0018] In the middle region 12, an indentation 15 is embodied, which has the shape of two intersecting circles 16, 17. The indentation 15 is sunken by approximately 0.2 mm relative to the top side 18 of the middle region 12. In the preferred case, one through hole 19, 20 is embodied in the holder body 11 at the center point of each of the circles 16, 17. The diameter of each through hole 19, 20 is 1 mm, for instance. The disposition of the indentation 15 in the middle region 12 is oriented centrally to or with the holder body 11.

[0019] The top side 18 of the middle region 12 is partly covered by a diaphragm 22. The diaphragm 22, shown by itself in Fig. 3, has a shape adapted to the inner contour 23 of the peripheral region 13, and on two opposed sides, one rectilinear edge each 24, 25 is provided. The diaphragm 22, which is likewise of plastic, preferably polyester, has a thickness of at most approximately 0.1 mm, and because of its material (polyester with a sealable coating) it can be sealed against the top side 18 of the middle region 12 of the holder body 11.

[0020] The disposition of the diaphragm 22 inside the inner contour 23 of the holder body 11 is such that the edges 24, 25 are located perpendicular to a center point axis 26, which intersects the center points of the circles 16, 17. Thus one diaphragm-free zone 27, 28 is formed between each of the edges 24, 25 and the inner contour 23 of the holder body 11.

[0021] In Fig. 1, two opposed sealing zones 31, 32 are also shown, by way of which the joining of the striplike diaphragm 22 to the top side 18 of the holder body 11 is effected. It can be seen that the sealing zones 31, 32 extend from the regions outside the edges 24, 25 as far as the periphery of the circular-arclike contours 33, 34 of the diaphragm 22.

[0022] A sealing fluid, in particular silicone oil, is disposed between the top side 18 of the holder body 11 and the diaphragm 22, as is known per se. It can also be seen from Fig. 2 that there is a spacing a between the top side of the elastic diaphragm 22 and the top side of the holder body 11.

[0023] The overpressure valve 10a of Fig. 5 differs from the overpressure valve 10 of Figs. 1 and 2 in that an adhesive layer 37 extending all the way around is applied to the top side of the peripheral region 13a of the holder body 11a. The adhesive layer 37, in place of the triangular raised area 14 of the overpressure valve 10, serves to join the overpressure valve 10a to the inside 2 of a length 3 of packaging material. The length 3 of packaging material is part of a packaging container, not shown in Fig. 5, which serves for instance to package coffee. A plurality of openings 4 are embodied in the length 3 of material inside the peripheral region 13a. The openings 4 may for example, as is well known, be formed by means of a suitable piercing tool either in the course of or after the attachment of the overpressure valve 10a to the length 3 of packaging material; the number and size of the openings 4 may vary, depending on the application.

[0024] The mode of operation of an overpressure valve 10, 10a can be described by saying that gas produced inside a package first reaches the vicinity of the through hole or holes 19, 20, because of the overpressure. The overpressure, which then acts inside the indentation 15 on the side facing it of the diaphragm 22, has the consequence that at a sufficiently high internal pressure, the diaphragm 22 lifts away outside the sealing zones 31, 32, forming conduits from the indentation 15 to the diaphragm-free zones 27, 28, and by way of these conduits the gas is conducted outward between the top side 18 of the holder body 11, 11a and the diaphragm 22. From the diaphragm-free zones 27, 28, the gas then flows through the openings 4 in the length 3 of packaging material forming the package to the environment. As soon as the overpressure in the package has been reduced, the through conduits for the gas close again; the sealing fluid applied between the diaphragm 22 and the top side 18 of the holder body 11, 11a brings about sealing off from the atmosphere, so that no oxygen from the air can get into the package interior. In experiments it has been found that the shape of the indentation 15 in the overpressure valve 10, 10a, which indentation comprises two intersecting circles 16, 17, makes an especially low opening pressure, such as 2 mbar, possible; that is, even very slight overpressures inside the package cause opening of the overpressure valve 10, 10a and thus cause a reduction in the overpressure in the package.

[0025] To make the possible disposition of an overpressure valve 10, 10a on a packaging container 5 clearer, see Fig. 6. The block-shaped packaging container 5 shown in Fig. 6, which serves particularly for packaging coffee, is folded from a portion of a length of packaging material by means of devices known per se, for instance a so-called spur wheel machine. A sealed top closure 6 can be seen, as well as a likewise-sealed bottom closure 7 that is folded against the underside of the packaging container 5. In the exemplary embodiment shown, an overpressure valve 10 is disposed on the inside of one side wall 8; from the outside, only a circular contour 9, resulting from the ultrasonic welding of the overpressure valve 10 to the packaging material, and the openings 38 in the side wall 8 are visible.

[0026] In Fig. 4, one further overpressure valve 40 is shown. The overpressure valve 40 differs from the overpressure valves 10 and 10a essentially in that the indentation 42 in the overpressure valve 40 has the shape of a stylized anchor 43. The shape of the anchor 43, which is a protected design trademark, already makes it possible to recognize the manufacturer of the overpressure valve 40 from outside. In the middle region of the overpressure valve 40, three through holes 44 are embodied inside the indentation 42. Diaphragm-free zones 45, 46 are located parallel to an axis 47, embodied by the three through holes 44, outside the diaphragm 48. The joining of the diaphragm 48 to the top side of the holder body 50 is done in the case of the overpressure valve 40 in the lateral regions of the striplike diaphragm 48, outside the indentation 42, in the connection zones 51, 52, so that in the regions between the through holes 44, in the direction of the diaphragm-free zones 45, 46, the diaphragm 48 is not joined to the holder body 50, and thus gas can escape to the diaphragm-free zones 45, 46.

[0027] The overpressure valves 10, 10a, 40 described may be modified in manifold ways without departing from the concept of the invention, which is that the overpressure valve 10, 10a, 40 comprises only two components, that is, the holder body 11, 11a, 50 and the diaphragm 22, 48, which are joined to one another in captive fashion, and in which an indentation 15, 42 is embodied in the region of through holes 19, 20, 44 and is covered by the diaphragm 22, 48. It is conceivable in particular to join the diaphragm 22, 48 to the holder body 11, 11a, 50 by an adhesive bond, instead of by ultrasonic welding. In addition, still other shapes of the indentations are conceivable, intended in particular to produce the lowest possible opening pressure.